
Subject: Re: exp function bug
Posted by [davidf](#) on Thu, 05 Dec 1996 08:00:00 GMT
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Andy Loughe <afl@cdc.noaa.gov> wrote:

> Robert Cannon wrote:
>>
>> Can anyone tell me what is going on here, or if it happens on other
>> platforms?
>>
>> The first time I call exp (-710.72026d0) after starting idl I get:
>>
>> hera:~> idl
>> IDL. Version 4.0.1 (IRIX mipseb).
>>
>> IDL> print, exp (-710.72026d0)
>> 2.8462073e+134
>> IDL> print, exp (-710.72026d0)
>> 2.1782760e-309
>>
>> This is on an sgi crimson. I get the impression the same may happen on
>> an alpha, but for a different value - it has to be -710.72026d0 on the
>> sgi: -710.72025d0 works fine.....
>
>
> For interest's sake...
> This does not happen on a SUN SparcStation running Solaris 2.5

Doesn't happen on a Mac either.

David

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Boulder, CO 80309-0449 | "If you are going to be blue, be bright
blue!"

Subject: Re: exp function bug
Posted by [Peter Mason](#) on Fri, 06 Dec 1996 08:00:00 GMT
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On Thu, 5 Dec 1996, Robert Cannon wrote:

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I think that `exp(-710.72026d0)` is on the borderline of giving a floating-point underflow on your platform. Here are some approximate values of "a" in `EXP(a)` beyond which a floating-point underflow occurs on IDL platforms I have available here. (I haven't observed inconsistencies like you did.)

PLATFORM A

Intel Pentium, NT3.51 -708.D

DEC ALPHASTATION 200 4/233, NT3.51 -708.D

DEC ALPHA/AXP 3000/500, OSF -744.D

(|A| is much smaller for single precision, of course.)

I don't really understand what could cause those inconsistent answers.

Here's, well, a stream of consciousness...

`EXP`(large neg value) used to silently return 0.0 in older versions of IDL (the way I prefer it to do), and when RSI introduced support for some floating point "denormals" (Infinity and NaN), things were quite strange initially: On my DEC OSF platform, `EXP(-x)` would generate an underflow error for moderately large x, but would cause IDL to crash with a segfault given a suitably large (much larger) x.

I think that when you're working right at the edge of FP precision like this, you can easily run into platform-specific differences. (For example, ALPHA/NT doesn't handle denormals in hardware.)

But I also think that `EXP(-710.72026d0) == 2.8462073e+134` is unacceptable at any time, and that you should send in a bug report. (Perhaps there is some bug in IDL's FP exception-handling code on the SGI.)

Peter Mason
